

REMARKS**I. Allowable Subject Matter**

Applicant gratefully acknowledges the indication of allowable subject matter in claims 2 and 3, but respectfully requests reconsideration of the anticipation rejection of claims 1 and 4 and obviousness rejection of claim 5.

II. Claim Objections

Claims 2 and 3 were objected to for alleged informalities. Also a clean copy of claim 3 was requested because the scanned version was not discernible.

A clean copy of claim 3 has been presented in an appendix attached to this amendment. The formulae in claim 3 were the result of a scan of the original application with a Lexmark X7170 combination printer, scanner, fax and copier (4 in 1) using Lexmark software. However special settings were required to adjust scanning area, brightness, cropped area, etc. This copy could be enlarged.

The primary objection to claims 2 and 3 on page 2 of the Office Action was that the various symbols, e.g. as for the hierarchical sequence, were not defined in a clear and concise manner and the relationships were not clear. Applicant respectfully disagrees.

First, claim 3 depends on claim 2 and the definition of symbols defined in claim 2 is not repeated in claim 3.

Second, $h(k)$, $k = 0, \dots, m - 1$ is not the error sequence, it is the hierarchical

sequence, which means that it has a special order to its elements, as defined by the explicit definition of "hierarchical sequence" on page 2, lines 4 to 24, in applicant's originally filed specification. It is well to remember that a patentee is his own lexicographer and that the term "hierarchical sequence" or " $h(k)$ " in applicant's claims is limited according to the definition on page 2 of applicant's specification.

Third the underscored symbols, like the underscored h , or \underline{h} , in the claims and specification have a special meaning that is very clear from the applicant's originally filed specification and also from the wording of claim 2. By comparing the sum in formula (6) on page 6 of applicant's originally filed specification with the wording on page 6, lines 11 to 24 (and also the same comparison can be made in claim 2), it would be clear to one of ordinary skill in the art that

$$\underline{h} = h(k), k = 0, \dots, m - 1 \text{ and also that}$$

$$\underline{\underline{h}} = h_3(k), k = 0, \dots, m - 1$$

In other words the underscore serves as a shorthand notation for the hierarchical sequence and the error sequence.

The symbol \sim is a shorthand for the sum, i.e. $\tilde{h} = \underline{h} + \underline{\underline{h}}$. This latter formula is the same as the written out formula 6 in lines 7 to 10 of page 6 of applicant's originally filed specification.

The other symbols like k and m are defined in claims 2 and 3 and the specification. The specification on page 2 clearly shows that k is an index, which

is an integer, which increases from 0 in steps (see page 2, lines 7 and 8, of the originally filed specification). The $m - 1$ is the maximum value of k .

The elements of the hierarchical sequence in the examples in applicant's specification at page 3, lines 25, and following and page 8, line 29, are special cases of the formula in claim 2 for the case of $\alpha = +1$.

The formula in claim 3 is also not really difficult to understand. Again the symbols that were defined in claim 2 are not defined again in claim 3, which is not unusual in patent claims and should be acceptable. The j is just a running index for the summation whose maximum value is the same as the maximum value of k , namely $m - 1$.

The second line is clearly the result of the following rule for addition:

$\sum (A_j + B_j) \bullet C_j = \sum A_j \bullet C_j + \sum B_j \bullet C_j$, where the summations are taken over the index j to $m - 1$. The brackets under the two terms in the second line merely show the definitions of $u(k)$ and $u_e(k)$ respectively. The brackets and the $u(k)$ and $u_e(k)$ are not actually part of the formulae in the second line. This is consistent with the last paragraph of claim 3.

Of course, in practice the correlation $v(k)$ would be calculated for each value of k from 1 to $m - 1$.

Lastly $v(k)$ is, of course, the correlation of the erroned hierarchical sequence $\tilde{h}(k)$, $k = 1, \dots, m - 1$, and $s(k)$, where $s(k)$ is the signal referred to in claim 1. In the case of a mobile phone system $s(k)$ is a transmitted signal that is received in a phone receiver.

Lastly, applicant's representative finds that the claims clearly point out the

metes and bounds of the claimed subject matter in a manner that is understandable to one of ordinary skill in the art.

Furthermore it is respectfully submitted that the currently pending claims comply with the patent statutes in title 35 of the United States Code. If the claims do not comply with the patent statutes in any way, it is respectfully requested that the portion of the claims that do not comply with the statutes and the particular statute should be pointed out during subsequent prosecution. The same goes for the regulations for patents in the code of federal regulations.

For the foregoing reasons and because of the filing of the clean copy of claim 3 attached herewith withdrawal of the objection to claims 2 and 3 and the specification is respectfully requested.

III. Anticipation Rejection of Claim 1

Claim 1 and 4 were rejected as anticipated under 35 U.S.C. 102 (e) by Shiraishi, et al (U.S. Patent 6,625,239), referred to below as US '239.

U.S. Patent 6,625,239 discloses a circuit for detection or determination of a frame synchronization signal in a receiver. I-symbol currents and Q-symbol currents are demodulated from a received signal, in which a BPSK modulated frame synchronization signal and super frame identifying signal each with a length of 20 symbols and an 8 PSK-modulated digital signal are time-multiplexed (abstract). The time-multiplexed signals are multiplexed according to a hierarchical transmission system, which is mentioned in column 1, line 19. In this hierarchical transmission system the frame synchronization signal and the super

frame identification signal are transmitted in each frame of a super frame with a fixed bit spacing TMCC from each other according to figures 7 and 8.

According to figure 1 and column 12, lines 51 to 52, which is cited in the Office Action as disclosing hierarchical sequences, first comparison circuit 60 to 63 and second comparison circuit 64 to 67 are provided. A correlation is performed by means of the first comparison circuit 60 to 63 in order to test for the possibility of capturing a frame synchronization signal (column 13, lines 16 to 43). Similarly a correlation is performed by means of the second comparison circuit 64 to 67, in order to test whether or not the upper frame identification signal can be captured (column 15, lines 33 to 45 and e.g. column 16, lines 22 to 23). Furthermore a circuit 90 is provided for capturing the frame synchronization signal, which does capture a frame synchronization signal when a correlation detection output of the first comparison circuit 60 to 63 and a correlation detection output of the second comparison circuit 64 to 67 have a predetermined temporal interrelationship (see column 18, lines 16 to 25).

In contrast in the method claimed in applicant's claim 1 a predetermined signal section, which is transmitted with a signal from a transmitter to a receiver, is stored in the receiver as an erroned hierarchical sequence. After the signal is received in the receiver a correlation $v(k)$ is performed between the received signal $s(k)$ and the stored erroned hierarchical sequence h in order to determine the position of the known (predetermined) signal segment in the received signal.

According to the explanation of the reasons for rejecting claim 1 in the Office Action the frame synchronization signal or also the super frame

identification signal should correspond to the known signal section of the pending claim 1. However the basic criteria from which the frame synchronization signal and the super frame identification signal are formed cannot be ascertained from US '239. The reference, US '239, only provides one example of a frame synchronization signal W1 in column 2, line 3, and two examples of a frame identification signal W2, W3 in column 2, line 19 and column 2, line 30. However these signals W1, W2 and W3 are clearly not hierarchical sequences, as defined on page 2, lines 4 to 24 of the specification of the present application.

The term "hierarchical sequence" never appears in US '239. Also the term "erred or errored hierarchical sequence" does not appear in this reference. There is no suggestion of this sort of sequence or building a representation of a signal section for a received signal from such sequences in US '239. Applicant is his own lexicographer and the term "hierarchical sequence" cannot be interpreted any broader than the explicit definition on page 2, lines 4 to 24, of applicant's originally filed specification. This definition requires all hierarchical sequences to have a certain special structure or order, which indeed repeats itself in a special manner according to the definition. An example of this sort of special order is provided by the hierarchical decomposition of the hierarchical sequence on page 9, line 9, into the subsequences given on page 9, lines 12 and 13. US '239 does not disclose that the sequences W1, W2 and W3 have special order so that they can be decomposed into subsequences like the example on page 9 of applicant's specification. Also the reference does not teach that the sequences are hierarchical sequences.

Thus US '239 does not disclose a correlation method for determining the location of a predetermined signal section using a hierarchical sequence to represent the signal section in the receiver. This reference does not teach that the frame synchronization signal is a hierarchical sequence and that the super frame identification signal is an error sequence, or the reverse, namely that the super frame identification signal is a hierarchical sequence and the frame synchronization signal is an error sequence, in the sense of the current claim 1.

Finally US '239 does not disclose the following feature of claim 1, namely that the correlation is formed as a sum of a correlation between the received signal and the stored hierarchical sequence (not errored) plus a correlation between the received signal and the stored error sequence. First, this results from the fact that US '239 does not disclose any hierarchical sequence, at least as defined on page 2 of applicant's specification (applicant is his own lexicographer). Second this feature is not disclosed in US '239 because this reference D1 never discloses that a correlation is the sum of two other correlations. In column 18, lines 16 to 22, of US '239 only the temporal interrelation between the correlation output of the first comparison circuit 60 to 63 and the correlation output of the second comparison circuit 64 to 67 is tested. A sum of the correlation outputs is not disclosed or suggested by the reference D1. The sum formation in column 13, lines 15 to 24, describes nothing other than the correlation of the received signals with the frame synchronization signal, in which the number of agreeing signal values between the received signal and the known frame synchronization signal is smoothly added up.

Since the subject matter of US '239 does not employ synchronization signals, which are composed of a hierarchical sequence and an error sequence, it does not provide the advantage of as rapid as possible a correlation with as few as possible computational operations and thus minimal computation effort, which permits a reduced power consumption and extended speech or stand by time, especially in the case of a mobile phone.

Thus the subject matter of the pending claim 1 is neither anticipated nor obvious from US '239.

The pending claim 4 was also apparently rejected as anticipated. The Office Action identifies a hint or suggestion in column 15, lines 26 to 31, in US '239 of a sum of a hierarchical sequence and an error sequence in which the error sequence includes a few as possible elements, which are different from 0. At this place in US '239 the reference describes reception of the frame synchronization signal, which can occur either correctly or erroneously depending on reception conditions. However the stated location in US '239 discloses nothing about the formation of a representation of a frame synchronization signal that is stored in the receiver for later correlations, especially not that the representation of the frame synchronization signal is a sum of a hierarchical sequence and an error sequence. When the frame synchronization signal in poor reception conditions is received with an error of one or two bits as in column 15, lines 26 to 31, that does not mean that the frame synchronization signal would be represented with the help of an error sequence, which has those one or two error bits, but that the frame synchronization signal

was corrupted during transmission. The corruption of the received frame synchronization signal by one or two bits thus has nothing to do with the formation of a representation of the known signal section as the sum of a hierarchical sequence and an error sequence according to the pending claim 1. Finally the error, which results from reception of the frame synchronization signal according to column 15, lines 27 to 31, is indeed completely known. Furthermore it was already established that the frame synchronization signal according to column 2, line 3 is not a hierarchical sequence and also reference D1 does not disclose that the sequence W1 is a hierarchical sequence.

For the foregoing reasons withdrawal of the rejections of claims 1 and 4 as anticipated under 35 U.S.C. 102 (e) by Shiraishi, et al (U.S. Patent 6,625,239) is respectfully requested.

IV. Obviousness Rejection of Claim 5

Claim 5 was rejected under 35 U.S.C. 103 (a) as obvious over Shiraishi, et al, in view of Kubler, et al.

The features of claim 5 are not currently relied on to establish patentability of any subject matter; claim 5 claims a preferred application of the method to a mobile telephone system. However the applicant's method is also applicable to other systems, such as radio communication networks.

Furthermore Kubler does not disclose or suggest a method of representing a predetermined signal segment of a signal to be received in a receiver as the sum of a hierarchical sequence and an error sequence. Kubler

does not ever mention the term "hierarchical sequence" or signals that can be represented by such sequences. A "hierarchical transmission system" does not necessarily used "hierarchical sequences".

The "hierarchical sequence" refers to a sequence of value elements used for representing a signal segment, while the term "hierarchical network or communication system" refers the manner in which a collection of transmitters and receivers are interconnected in a fixed manner or are controlled, e.g. by a router or the like. The former concept is entirely different from the latter concept. The Kubler reference only mentions a "hierarchical network or communication system", and not a "hierarchical sequence".

Thus Kubler does not supply the required hint or suggestion of the modifications of the primary reference that are necessary to arrive at the method claimed in claim 1 of the primary reference, US '239.

It is well established by many U. S. Court decisions that to reject a claimed invention under 35 U.S.C. 103 there must be some hint or suggestion in the prior art of the modifications of the disclosure in a prior art reference or references used to reject the claimed invention, which are necessary to arrive at the claimed invention. For example, the Court of Appeals for the Federal Circuit has said:

"Rather, to establish obviousness based on a combination of elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the applicant...Even when obviousness is based on a single reference there must be a showing of a suggestion of motivation to modify the teachings of that reference.."*In re Kotzab*, 55 U.S.P.Q. 2nd 1313 (Fed. Cir. 2000). See also M.P.E.P. 2141

For the foregoing reasons withdrawal of the rejection of claim 5 as obvious under 35 U.S.C. 103 (a) over Shiraishi, et al, in view of Kubler, et al, is respectfully requested.

Furthermore, it is respectfully submitted that claims 1 and 4 should not be rejected as obvious under 35 U.S.C. 103 (a) over Shiralshi, et al, in view of Kubler, et al.

V. Specification and Abstract Changes

Some formal changes were made in the specification to put the specification in a form that is more acceptable according to U.S. Patent Office Rules.

Appropriate changes and additions have been made to the section headings to conform to U.S. Patent Practice. Also references to the claims by number in the specification have been eliminated as required by the rules.

The abstract has been revised to eliminate legalistic wording and define the invention in more concise terms.

VI. European Search Report

The European Search Report found that all the claimed method in the current claims was novel and unobvious.

Should the Examiner require or consider it advisable that the specification, claims and/or drawing be further amended or corrected in formal respects to put this case in condition for final allowance, then it is requested that such amendments or corrections be carried out by Examiner's Amendment and the case passed to issue. Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing the case to allowance, he or she is invited to telephone the undersigned at 1-631-549 4700.

In view of the foregoing, favorable allowance is respectfully solicited.

Respectfully submitted,



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APPENDIX TO THE AMENDMENT IN SER. NO. 10/089,208

The following is the requested clean copy of the originally filed claim 3:

3. The method according to Claim 2, wherein the correlation $v(k)$ of \tilde{h} having the signal $s(k)$ is described by:

$$\begin{aligned} v(k) &= \sum_{j=0}^{m-1} \tilde{h}(j) \cdot s(k+j) = \sum_{j=0}^{m-1} [h(j) + h_e(j)] \cdot s(k+j) \\ &= \underbrace{\sum_{j=0}^{m-1} h(j) \cdot s(k+j)}_{u(k) :=} + \underbrace{\sum_{j=0}^{m-1} h_e(j) \cdot s(k+j)}_{u_e(k) :=} \end{aligned}$$

wherein $u(k)$ is the correlation between the signal $s(k)$ and the stored hierarchical sequence, and $u_e(k)$ is the correlation between the signal $s(k)$ and the stored error sequence.